



Is a wireless LAN right for my small or medium business?

SMB Guide to WLAN



**Yes. Introducing Intel® Centrino™
Mobile Technology.**



Why go wireless?

High-speed Internet and e-mail access are business essentials these days. In most companies, the smartest way to provide these services is through a local area network (LAN).

But in small- to medium-sized businesses (SMBs), it's often difficult to match a wired network to quickly changing work patterns or fast growth.



Considering wireless

That's why so many SMBs are looking into wireless LAN (WLAN) technologies. With a wireless network, installation and setup times are often quicker, easier, and less expensive than wired alternatives that require significant infrastructure investments. Because there aren't any cables to run through walls and ceilings, installation and setup are quicker, easier and less expensive than wired alternatives that require significant infrastructure investments. Plus, WLANs offer the flexibility to rapidly add or move users, and expand coverage in cost-justifiable increments as your business grows. You can even use a WLAN to set up networks in temporary spaces, such as trade shows and conference rooms.

Wireless improves productivity

WLANs give employees the freedom and convenience to work when and where they want.* Users can improve productivity by working and collaborating in wireless-enabled locations outside of their cubicles and offices — such as conference rooms, break areas, and even coffee shops and other offsite locations. Everyone from the CEO to the sales representative gets more done with continuous, high-speed access to network resources, the Internet and e-mail. And if needed, they can run business-critical applications and retrieve sensitive data over the same wireless network.

Selecting your WLAN standard.

Understanding the standards

Before getting too far into the decision-making process, it's best to determine which type of WLAN is right for your business. There are currently two industry standards defined by the Institute of Electrical and Electronics Engineers (IEEE): 802.11b and 802.11a. The wireless standard you choose depends on application requirements and your usage patterns. The table below summarizes the differentiating features of each standard.

802.11b

A key feature of 802.11b is its maximum data rate of 11 Mbps per channel. That's faster than most Internet broadband connections these days. Additionally, due to a larger installed base, 802.11b is more widely available today than other standards. You can also sustain higher data rates by installing multiple access points in larger coverage areas, enabling users to roam from one access point to another. One thing to consider is that in order to maintain reliable connections, you may need to adjust the distance between the user and access point. This is true for both 802.11b and 802.11a standards.

802.11a

If you anticipate greater throughput requirements than 802.11b provides, you may want to opt for 802.11a, which provides a maximum data rate of 54 Mbps per channel and has eight available radio channels for frequency reuse. Increasing the number of non-overlapping channels increases performance

capacities. The IEEE 802.11b standard has three non-overlapping channels and provides ample support for users requiring Internet and e-mail functionality. However, the IEEE 802.11a standard with eight non-overlapping channels provides maximum bandwidth (up to 13 times the bandwidth of 802.11b) with capacity to transfer larger data and higher-resolution graphics files, whether conferencing or working in a collaborative environment.

Also note that 802.11a makes use of the 5 GHz radio band, whereas 802.11b operates in the 2.4 GHz frequency range, which is shared by Bluetooth* devices, cordless phones, microwave ovens and other sources of possible interference. 802.11a uses the cleaner 5 GHz spectrum for better throughput, increased capacity and reduced interference.

Dual band 802.11a/b

You also have the choice of dual band WLAN products, which increase business IT flexibility and provide additional user bandwidth by simultaneously supporting both 802.11b and 802.11a wireless networks. Dual band protects your existing investments in 802.11b technologies while letting you gradually upgrade to the higher-throughput 802.11a standard when your business is ready. This lets you deploy additional wireless PC cards and USB adapters into your business infrastructure without forcing a complete and immediate turnover of technology.

Wireless standards comparison

Standard	IEEE 802.11b	IEEE 802.11a
Available RF channels	3 non-overlapping	8 non-overlapping (4 non-overlapping in some countries)
Frequency band	2.4 GHz	5 GHz
Maximum data rate/channel	11 Mbps	54 Mbps
Typical range	100 ft (30 m) @11 Mbps 300 ft (91 m) @1 Mbps	40 ft (12 m) @54 Mbps 300 ft (91 m) @6 Mbps

Maintaining security.

WLAN transmissions typically extend beyond the building. Since you'll often be transmitting sensitive business information, you'll undoubtedly have security concerns and should take care to incorporate robust security solutions.

Suggested security measures

Securing your WLAN isn't overly difficult, and many vendors are helping with easy-to-use products and competitive pricing. There are also a number of security measures supported by 802.11a and 802.11b that you can use to more safely and reliably conduct business over your wireless network. So which ones are right for your small or medium business?

At a minimum, an SMB looking to secure its WLAN should:

- **Change your access points' Service Set Identifier (SSID).** The SSID identifies your WLAN. Clients must be configured with the correct SSID to access your WLAN. Unfortunately, using default SSIDs and passwords is a very common practice — and a welcome mat for hackers.
- **Disable SSID broadcasting.** This prevents access points from broadcasting the network name and associating with clients that aren't configured with your SSID.
- **Add a firewall.** Even the most inexpensive firewall between the access point and the wired network, as well as on the client, can provide basic authentication — and deter most would-be intruders.
- **Enable Wired Equivalent Privacy (WEP).** WEP encrypts wireless data streams between clients and servers, helping prevent unauthorized users from reading traffic while it is in transit. However, because WEP only secures the data link and physical layers, it doesn't offer end-to-end security and can be broken easily. Experts recommend layering WEP with other, more robust, encryption measures.

SMBs need to be aware, however, that the previous measures do not guarantee absolute data and network security — they make up only the initial layer of protection. The most desirable approach is to add incremental tiers of security to make it extremely difficult for outsiders to break into your wireless network. For example:

- **Use Media Access Control (MAC) address authentication.** If you have a manageable number of clients (less than 50 users), MAC addressing lets you restrict access to your access points by specifying the unique hardware address of each authorized end-user device in an access control list — and allowing only those specific devices to connect to your WLAN.
- **Augment WEP by implementing virtual private networks (VPNs).** VPNs use encryption and other security mechanisms to create a secure "tunnel" through which you transmit data between chosen clients or network endpoints. This end-to-end security ensures that only authorized users can access the network and that your data cannot be intercepted while en route. Additionally, VPNs provide secure connections for employees accessing the company network remotely — a benefit that WEP does not provide. With VPN costs decreasing due to the proliferation of scaled-down, lower-priced hardware and software solutions, SMBs can now enjoy higher levels of security even within smaller IT budgets.

In the future, you might also consider the following standards-based technologies for securing your WLAN, as they become available and affordable:

- **Wi-Fi* Protected Access (WPA).** This technology will fix known issues with WEP and serve as an interim security solution for WLANs until 802.11i is finalized. WPA uses the Temporal Key Integrity Protocol (TKIP) for securing data streams. It should be available for deployment in the second half of 2003.
- **IEEE 802.11i.** It features new authentication procedures and stronger encryption algorithms such as Advanced Encryption Standard (AES) to provide an alternative to WEP. 802.11i is expected to become available sometime in 2004.

One thing to keep in mind with these last two technologies is that they do not provide end-to-end security and thus do not secure remote connections. If you have employees who will be accessing your company network from remote locations, a VPN is still your best bet for maintaining secure connections over the Internet.

Security in a nutshell

Ultimately, the security of your network — whether wired or wireless — depends on you. Failure to use basic, industry-standard security features such as those mentioned here is the most likely cause of unauthorized access to your network. With a little attention, minimal cost and — most of all — well-thought-out security policies, your WLANs don't have to be the weak link in your network's security.

“We’ve found [VPNs] to be very secure and cost-effective. What we like about [them] is that we can use the same technology internally to secure our wireless environment and externally to enable secure remote connections via the public Internet.”

John Johnson, Director and General Manager
of Productivity, Collaboration and Security
Programs at Intel Corporation



“SMBs should consider ways to protect their wireless LAN implementations from tampering. Security options include using virtual private network clients... or proprietary wireless security provided by the major vendors...”

Gartner, Inc., May 1, 2002: “Wireless LANs:
Ideal for Many SMB Installations”

Migration paths from here to there.

Key considerations for which type of WLAN to deploy are the configuration of your current network, and where you'd like to take it.

Currently have no network

First-time networking	For growing small businesses, wireless networking provides lower initial installation costs and offers a higher degree of flexibility than a wired network. This makes particularly good sense if you're leasing office space, as your investment can be easily moved.
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Currently support a wired network

Retrofitting	Long-time network owners upgrading their infrastructure incur lower installation costs when upgrading to wireless technologies. Plus, WLAN portability lets you maintain business-critical network connectivity—even if you outgrow your current office space.
Adding a secondary network	Those interested in enabling mobility for even a small percentage of their workforce can realize productivity gains with a wireless network. Mobile employees who have continuous access to online resources are able to make faster decisions with higher accuracy.
Relocating employees	WLANs reduce the wiring and administrative costs associated with relocating workers within your facility. After a move, employees connect to the nearest access point—and instantly have the same configuration, permissions and applications they had before.

Currently support both wired and wireless networks

Increasing mobility	Interested in increasing the number of mobile workers or locations supported within your collaborative work environment? You can immediately scale your WLAN by adding more WLAN-enabled notebooks and access points.
Enhancing performance	If you've already deployed 802.11b and wish to take performance to the next level, 802.11a may be for you. Dual band WLAN products let you support both standards simultaneously, protecting your existing investment.
Expanding business operations	Once wireless networking becomes part of the business infrastructure, its lower costs, flexibility and portability tend to make it the solution of choice during periods of expansion and growth.

“SMBs should seriously look at wireless LAN in place of a wired LAN, in small offices and temporary locations where it is too costly to install a new wired system and in offices that do not have a LAN but need one.”

Gartner, Inc., May 1, 2002: “Wireless LANs: Ideal for Many SMB Installations”

Decreasing total cost of ownership.

“Wireless LAN technology is now a viable option for small and midsize businesses (SMBs). Lower costs and solid performance make wireless LANs a networking answer in several SMB environments.”

Gartner, Inc., May 1, 2002: “Wireless LANs Ideal for Many SMB Installations”



- WLANs let you install only the amount of networking infrastructure you need—and add users and expand coverage in cost-justifiable increments as needed.
- Wireless networks are less expensive to install than wired alternatives. For example, eliminating cabling has been shown to save businesses up to \$150–\$350 per user.¹
- The costs for adds, moves and changes are significantly lower with a WLAN. Costs are reduced or eliminated when establishing new network connections, making network configuration changes and updating network documentation.
- With prices for WLAN hardware dropping, moving to a wireless network in conjunction with mobile PCs provides users with a rich, substantial networking experience at a reasonable cost.

In the end, the decision of whether or not to invest in WLAN technologies should be based on an assessment of anticipated business value versus the required investment for the technology. And that assessment is going to be unique for each business.

Deploying a WLAN in your SMB.

Before you get started, be sure to take into consideration the coverage and bandwidth you'll need, the number of clients that will be connecting, and areas for future expansion.

Most wireless solutions include some type of site survey utility for determining component placement. And many times, your network vendor can conduct an onsite evaluation of your environment for you.



WLAN: Instant benefits for SMBs

A big win for the law firm

Three lawyers and their paralegal wanted to share a broadband Internet connection, but they didn't want to spend a fortune wiring their leased office space. The verdict? They installed a wireless gateway. They didn't have to pay a technician for the installation. And they avoided the hassle of running Ethernet to each individual user in the office — meaning the firm wins big on reduced costs as well as clutter.

Even consultants can use a helping hand

A growing consulting firm is constantly rearranging office space to accommodate new employees. The costs of rewiring the office have become a serious concern. Say nothing of the downtime of waiting for wired connections to be installed. With a WLAN, however, the costs of adding or moving users are much lower, and new hires are up and running within minutes of walking in the door.

WLAN configurations

One of the biggest benefits of wireless networking is its flexibility. You can deploy and configure a WLAN to meet a variety of user needs:

Point-to-point and point-to-multi-point bridging.

Point-to-point and point-to-multi-point bridging connects multiple WLAN-enabled buildings. Instead of using wires to connect two buildings, a WLAN can be deployed to create one network spanning both. Users move from one building to the next, enjoying a seamless wireless experience.

Temporary networks. Short-term or ad hoc work sites, such as trade shows, often necessitate temporary connectivity requirements. Setting up temporary WLANs allows the exchange of files and communication between PCs, network devices and printers.

Public hotspots.² Hotspots are WLANs in public spaces such as bookstores, coffee shops, hotels and airports. These public hotspots free mobile users from conventional office spaces and office hours, providing customers and employees alike with convenient, high-speed remote access to online resources.⁺



Scaling your WLAN

You can design your WLANs to be as simple or complex as needed to meet the requirements of specific applications and installations. WLANs are highly scalable — from peer-to-peer networks suitable for small offices to enterprise-scale networks of thousands of users that span corporate campuses.

That's a good thing. Because as a growing small- to medium-sized business, your networking needs will undoubtedly change. You may need to add more employees, which is as easy as adding a few notebook PCs with integrated WLAN connectivity. And as your office space grows, expanding coverage or bandwidth is a simple matter of adding another wireless gateway or access point. WLANs scale immediately, so people can get back to business.

What's coming in wireless?

The popularity of wireless LANs both in businesses and at home has been intensifying rapidly in recent years and shows no signs of diminishing. A few driving factors include the emergence of integrated or embedded WLANs in notebook PCs; the expanding public WLAN infrastructure; and new wireless-friendly software and hardware products from Microsoft and Intel.

Integrated WLAN connectivity

The best way to outfit your users with wireless LAN connectivity is to purchase notebook PCs with integrated WLAN solutions. Gartner also recommends this approach, given rapidly declining costs and the benefits that internal solutions provide over external options. "The cost of embedded wireless LAN adapters will reach \$50 by year-end 2002. The cost of a post-purchase upgrade is estimated at \$250... The benefits of better coverage, better power management, user simplicity, fewer lost or stolen cards, and no broken antennas [further] strengthen the case for time-of-purchase wireless LAN installation."³

Wireless infrastructure is growing

Gartner notes that "[wireless] LANs are set to become a truly pervasive technology... With a projected installed base of nearly 110 million notebooks by 2006, a good percentage of these users will demand [wireless] access."³

In concert with the growth of wireless notebook users has been the explosion of public WLAN "hotspots" worldwide. Gartner conservatively estimates the number of wireless hotspots to "increase from slightly

more than 1,000 at year-end 2001 to more than 21,000 by year-end 2004."⁴

This type of ubiquitous WLAN coverage will enable mobile PC users to not only improve the quality of their lives, but also to increase productivity while enjoying even a simple cup of coffee.⁺ And although 802.11b is typically used at most public hotspots today, Gartner does foresee this changing in the near future, "as vendors switch to 802.11a-based products to increase bandwidth and to avoid interference issues... [This will create] a broad base of both consumers and enterprise users that can take advantage of hotspot deployments."⁴

Intel gives Wi-Fi a boost

Continuing Intel's legacy of investing in wireless programs, Intel Capital announced in October 2002 its plans to invest \$150 million in companies developing 802.11 Wi-Fi technology. These include companies looking to develop easier-to-use and more secure wireless network connections, new network services, simpler billing procedures, more robust components and new ways to connect to high-speed networks. This move aims to accelerate wireless infrastructure deployment and proliferate the Wi-Fi standard worldwide.

A case for Windows* XP Professional

Microsoft* Windows* XP Professional offers numerous wireless support features for a better mobile computing experience.

Features such as Windows XP Zero Configuration and Network Location Awareness enhance wireless connectivity by enabling a WLAN-enabled notebook PC to detect and connect to wireless networks without user intervention.

Once you're connected to a wireless network, Windows XP Professional runs a wide range of performance, manageability and security features in the background environment. These include Wireless Networking Support, Internet Connection Firewall, Encrypting File System (EFS) support and System Restore. These features benefit mobile users with faster, more reliable wireless networking that's better secured.

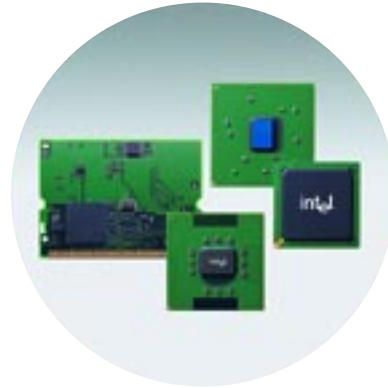
Introducing Intel® Centrino™ Mobile Technology

Intel® Centrino™ mobile technology is a revolution in wireless mobility. Based on a distinctive mobile architecture designed specifically for notebook PCs, it combines a mobile-specific CPU and chipset with integrated wireless LAN capability.* For small and medium businesses looking to go wireless, it offers innovative new features such as:

- **Single and dual band WLAN support** to enable wireless connections to both 802.11a and 802.11b Wi-Fi certified access points.*[∞]
- **Intel® PROSet software** to allow setup of an unlimited number of profiles to connect to different WLAN networks. It also provides automatic switching between wired LAN and the appropriate wireless network currently available (whether 802.11a or 802.11b).*
- **Real-time calibration** available with 802.11a to dynamically optimize wireless performance. It adjusts output power to compensate for temperature changes, increasing throughput and range.*[∞]
- **Intel® Wireless Coexistence Solution** to reduce interference between Intel® PRO/Wireless Network Connection and certain Bluetooth devices, both of which operate in the 2.4 GHz frequency band.

Furthermore, Intel Centrino mobile technology supports the best of industry-leading proprietary and advanced standards-based security solutions:

- Intel Centrino mobile technology has been validated with leading VPN solutions from Cisco, Check Point, and Microsoft.
- Intel is in collaboration with VeriSign to fully validate their software-based Personal Trust Agent (PTA) on Intel Centrino mobile technology for key management, authentication and digital signatures.



Learn more

For more information on outfitting your small- to medium-sized business with WLAN technology, visit us on the Web at:

intel.com/smallbusiness/mobile

And for more detail on specific topics mentioned here, please take a look at the following white papers, posted at:

intel.com/ebusiness/wireless

Wireless Security and VPN (Intel IT)

WLAN: Linking Productivity and ROI (Intel IT)

Wireless LAN: Improving Productivity and Quality of Life (Sage Research)

Wireless LANs for Notebooks Begin to Make Sense (Gartner, Inc.)

intel.com/smallbusiness/mobile

+ Wireless connectivity and some features may require you to purchase or download additional software, services or external hardware. Availability of public wireless LAN access points limited. System performance measured by MobileMark[®] 2002. System performance, battery life, wireless performance and functionality will vary depending on your specific hardware and software configurations. See http://www.intel.com/products/centrino/more_info for more information.

∞ Dual band availability targeted to follow Intel Centrino mobile technology launch, contact your PC manufacturer for more details.

1 Giga Information Group, April 24, 2002: "Using Total Economic Impact to Determine Whether to Deploy a Wireless LAN"

2 Hotspots are public spaces, such as airports, train stations, hotels and coffee shops that enable wireless Internet connections.

3 Gartner, Inc., August 1, 2002: "Wireless LANs for Notebooks Begin to Make Sense"

4 Gartner, Inc., October 10, 2002: "How Hot Will Public Wireless 'Hotspots' Become?"

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